Wave simulators as a means of preventing covid-19

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Abstract

Objective of the study was to scientific substantiation of physical culture means for the prevention of the incidence of covid-19 in children and youth. Methods and structure of the study. The experiment involved children aged six to ten who attended elementary school and kindergarten No. 1604. Pedagogical impact was aimed at identifying the results of classes with wave simulators. Indicators of pulse, arterial pressure, physical development and physical fitness were determined.

Results and conclusions. As the study showed, physical activity with children aged 6-10 years using wave simulators has a positive effect on hemodynamics, which is expressed in a significant ($p<0.05$) decrease in heart rate and systolic pressure at rest, within the age norm; unreliable increase in indicators of physical development ($p>0.05$); a significant increase in the development of physical qualities ($p<0.05$).

The results of the study testify to the health-improving effect of training with wave simulators, the economization of the indicators of the cardiovascular system, as well as the development of the basic physical qualities of children from 6 to 10 years old.

Keywords: *wave simulators, training effect, prevention and rehabilitation of covid-19.*

Introduction. Recently, children have been increasingly exposed to infection with the omicron strain, and so far, studies have not been disseminated in the literature that answer the question: what means can be used to reduce the risk of infection with this disease in the population of our country and will contribute to recovery after the disease?

Many scientists have proven that the means of physical activity and sports are effective for improving health and reducing the incidence of the population [3].

Objective of the study was to scientific substantiation of the effectiveness of the application of wave biomechanics technology for the prevention of the incidence of covid-19 in children and youth.

Methods and structure of the study. As a means of wave biomechanics, the Agashin simulator was used [1]. It is known that when performing exercises with wave simulators, a so-called biomechanical wave is created, the essence of which is the alternation of tension and relaxation of the muscles involved in the movement. The consequence of this alternation is the emergence of biomechanical resonance, when under the influence of an external stimulus, which is the Agashin simulator, there is an effect of consistency in the activity of all functional systems of the body of the practitioner [2]. The technique of training with the Agashin simulator is described in the monograph [4, p. 108-113].

The pedagogical experiment involved 130 children attending kindergarten and primary school, who were divided into control and experimental groups (Table 1).

The study studied the dynamics of indicators of the cardiovascular system, the level of physical development of the participants in the experiment.

Results of the study and their discussion. As

Table 1. *Characteristics of the composition of the participants in the pedagogical experiment*

List of participants	Control group	Experimental group
Preparatory group	21	21
1st class	22	22
2nd class	22	22

Table 2. *Indicators of the cardiovascular system of children of preschool and primary school age*

Group, class	Date of measurement	heart rate at rest	Upper resting blood pressure	Lower resting blood pressure
Preparatory group	Start of PE	87±6,2	89±5	59±5,6
	End of PE	82±5,1	85±3,7	57±5,3
	p	<0,05	<0,01	>0,05
1st class	Start of PE	86±4,7	90±6,3	56±4,2
	End of PE	80±5,5	84±4,2	53,9±5,8
	p	<0,01	<0,01	>0,05
2nd class	Start of PE	81±6,1	89±6,4	56±4,6
	End of PE	77±5,3	86±5,3	58±3,9
	p	<0,01	<0,05	>0,05

*PE - pedagogical experiment lasting 9 months.

Table 3. *Indicators of physical development of the surveyed children of preschool and primary school age*

Group, class	Date of measurement	Height, cm	Weight, kg	Strength of the right hand, kg	Strength of the left hand, kg
Preparatory group	Start of PE	119.0±4,7	24.0±5,3	6,2±1,5	5,7±1,5
	End of PE	122,1±4,9	25,7±5,9	7,6±1,5	7,1±1,6
	p	>0,05	>0,05	<0,01	<0,01
1st class	Start of PE	126.0±4,3	26,3±3,9	9,3±2,4	7,8±2,1
	End of PE	128,8±4,3	28,8±4,8	11.0±2,3	9,5±2,2
	p	>0,05	>0,05	<0,05	<0,05
2nd class	Start of PE	133,9±6,1	29,9±6,2	10,2±2,6	9,5±2,5
	End of PE	136,2±6,3	32,5±6,9	11,5±2,6	9,9±2,4
	p	>0,05	>0,05	>0,05	>0,05

the study showed, the average values of heart rate and blood pressure, measured at rest, significantly decrease in both preschoolers and primary school students by the end of the school year. The indicators of systolic blood pressure also significantly decrease ($p<0.01$, $p<0.05$). However, the indicators of diastolic blood pressure decrease during the academic year, but do not reach the boundaries of significant differences ($p>0.05$). The values of these indicators are within the age limits for children of this age. But a decrease in heart rate and systolic pressure confirms the trend towards economization of the work of the cardiovascular system, which is probably associated with the propagation of a biomechanical wave, which leads to a change in the lumen of blood vessels in working muscles.

During one three-minute session with the simulator, this clearance value changes from 180 to 300 times, depending on the characteristics of the simulator used and the rhythm of movements chosen by the child. Such training significantly increases the elasticity of the walls of blood vessels, the child's ability to quickly adapt to changing external conditions is trained.

In table 3 presents data on the indicators of physical development in children participating in the pedagogical experiment. It turned out that the growth of the participants in the experiment did not change signifi-

Table 4. *Indicators of the development of physical qualities of the examined children of preschool and primary school age*

Group, class	Date of measurement	Run 30 m, s	Standing long jump, cm	Raising the body in a sitting position for 30 s, times
Preparatory group	Start of PE	7,1±0,20	109,3±3,4	15±1,1
	End of PE	6,6±0,10	120,7±4,2	19±1,5
	p	<0,05	<0,05	<0,05
1st class	Start of PE	6,7±0,13	122,6±2,6	18±1,2
	End of PE	6,3±0,12	130,0±2,0	22±1,4
	p	<0,05	<0,05	<0,05
2nd class	Start of PE	6,5±0,14	127,8±3,6	14±2,0
	End of PE	6,1±0,11	137,0±2,4	20±2,1
	p	<0,05	<0,05	<0,05

Table 5. *The number of children classified by the level of physical development in groups with low, medium and high levels of development of physical qualities*

Preparatory group	Human gender	Pedagogical experiment					
		Start			End		
		Low	Medium	High	Low	Medium	High
	Boy	-	2	8	1	2	7
	Girl	3	1	5	-	4	5
1st class	Boy	1	3	6	1	2	6
	Girl	1	6	6		5	8
2nd class	Boy	5	5	4		2	11
	Girl	3	4	4	2	2	5

cantly (p 0.05). Although the average growth in children of the preparatory group increases by an average of 3.0 cm over the analyzed period, and weight - by 1.7 kg. The picture is similar for students of the first and second grades (Table 3). Therefore, we can conclude that the indicators of physical development in children of this age increase relatively evenly.

On the contrary, the indicators of carpal dynamometry significantly increase during the pedagogical experiment. At the same time, the increase was higher in preschoolers ($p<0.01$) than in elementary school students ($p<0.05$).

During the pedagogical experiment, data on the development of physical qualities in children of the studied age were recorded (Table 4).

The presented data indicate that the inclusion of exercises with wave simulators makes it possible to achieve a significant increase in the absolute values of indicators characterizing the development of speed, speed-strength qualities and strength endurance in children participating in the experiment ($p<0.05$).

This trend is also confirmed by the data on the number of children assigned to a certain level of development of physical qualities, presented in Table 5.

Significantly from 4 to 11, the number of boys of the 2nd grade, demonstrating a high level of development of physical qualities, increased. On the contrary, guys appeared in the preparatory group, the results of which decreased. Probably, this decrease is explained by the fact that they were sick the day before and did not have time to recover from the illness.

Conclusions. Physical activity with children aged 6-10 years using wave simulators has a positive effect on hemodynamics, which is expressed in a significant ($p<0.05$) decrease in heart rate and systolic pressure at rest, within the age norm; unreliable increase in indicators of physical development ($p>0.05$); a significant increase in the development of physical qualities ($p<0.05$).

The advantage of exercising with the Agashin simulator is that a large room is not required, since the area for exercising with a wave simulator does not exceed 2 m2 per person. Significant range of motion: within five minutes, a person can perform up to 600 muscle

contractions at a frequency of 2 Hz / min and up to 900 muscle contractions at a frequency of 3 Hz / min.

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